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***Lactarius* taxa by Zdeněk Schaefer – types and other collections in PRM**

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ABSTRACT— Extant PRM herbarium vouchers of *Lactarius* taxa described, validated, or neotypified by Zdeněk Schaefer are enumerated and discussed. For each taxon, the holotype, paratypes, other original materials, and later collected specimens identified or revised by Schaefer are cited. The nomenclatural status of each taxon is evaluated and information from published revisions/discussions is summarized. These data provide a basis both for thorough revisions by classical and molecular methods and for future lecto- or neotypifications. Such revisions are encouraged because some of Schaefer's taxa (e.g., *L. albocremeus*) may represent good species while others should clearly be synonymized with earlier published taxa. Currently accepted taxa are *L. pilatii* and *L. bertillonii* ($\equiv$ *Lactifluus bertillonii*).

KEY WORDS—*Basidiomycota*, *Russulales*, taxonomy, nomenclature, Europe

Introduction

Zdeněk Schaefer (1906–1974), a chemical engineer in the glass industry, was a Czech amateur mycologist who became interested in fungi in 1936. In 1945 he decided to focus on *Lactarius* (Herink 1977), eventually publishing 29 works on the genus, mostly in the leading Czech journal, ČESKÁ MYKOLOGIE (now CZECH MYCOLOGY). For his biographies and bibliographies, see Pouzar (1966) and Herink (1977). Schaefer was known for his detailed approach and his narrow species concept. Material studied by him is now stored in the mycological herbaria of the National Museum in Prague (PRM), the Moravian Museum in Brno (BRNM), and (rarely) in the Slovak National Museum in Bratislava (BRA). After his death, his family threw away his personal herbarium (including some types; Z. Pouzar, pers. comm. 2013) because of insect infestation; consequently, only a small part of his collection is conserved in PRM (mostly collections from earlier periods of Schaefer's work).

In the late 1960s, Schaefer prepared a Czech-language monograph of Czechoslovakian *Lactarius* species. However, the work remained unpublished because of political restrictions following the 1968 “Prague spring” and Soviet occupation. The original typewritten manuscript, accompanied by Schaefer’s coloured pencil drawings of *Lactarii*, is deposited in the Museum of Eastern Bohemia in Hradec Králové (HR), and photocopies are available in PRM and BRNM. He had planned to publish about 70 new taxa (species, varieties, forms) in his monograph.

Schaefer published more than 20 new taxa of *Lactarius* (species and varieties) in various papers (1948, 1956, 1957, 1958, 1960, 1966, 1968, 1970, 1972, 1979), the last of which (Schaefer 1979) was prepared from his unpublished paper by the ČESKÁ MYKOLOGIE Editorial Board (Z. Pouzar, pers. comm. 2013) and published five years after his death. In other papers Schaefer also validated names published by Smotlacha (1947) and Neuhoff (1956) and designated a neotype for a 1920 Velenovský name. Schaefer’s new taxa, which might represent real species or varieties, need a thorough revision. The only broadly focused revision was done by Basso (1999), who used only a part of the available vouchers.

Our intention here is to clarify which types, other original materials, and later collections identified by Schaefer are stored in PRM. Taxa supported by these vouchers can be studied both by classical and DNA methods, which is important for further development of *Lactarius* taxonomy. A paper devoted to collections in BRNM should be prepared by local curators.

Materials & methods

Only published *Lactarius* taxa (both valid and invalid names) by Schaefer are included. They are arranged alphabetically under *Lactarius*, including two recent synonyms in *Lactifluus*. New taxa proposed in Schaefer’s unpublished monograph (see Introduction) are omitted, as they are not published effectively. Each entry starts with bibliographic data on the Latin, Czech, and/or German descriptions. As Schaefer’s publications are poorly arranged and tend to confine detailed information to the Czech text, we compiled and translated the important voucher data to English. The following materials from PRM are cited for each taxon: holotype, paratypes, other original materials (not cited with all details in the protologue but certainly used for its preparation), and other collected specimens subsequently identified or revised by Schaefer. The localities are given not in their original form but are amended based on data accumulated from herbarium labels, Latin descriptions, and Czech or German descriptions/discussions and supplemented with current geographic data. Taxonomic and nomenclatural terms are in accordance with the current International Code of Nomenclature for algae, fungi, and plants (McNeill et al. 2012), abbreviated as ICN. Herbarium abbreviations follow Thiers (2013). Taxonomic remarks are based on synonymies, discussions, and revisions published in European *Lactarius* monographs (Korhonen 1984, Heilmann-Clausen et al. 1998, Basso 1999, Kalamees 2011).

Results & discussions

Lactarius albocreus Z. Schaefer, Česká Mykologie 12: 211, 1958.

LATIN DIAGNOSIS/DESCRIPTION: Česká Mykologie 12: 211, 1958.

DETAILED CZECH DESCRIPTION: Česká Mykologie 12: 208–209, 1958.

HOLOTYPE — designated. Slovakia, Western Carpathians, NNE of Poprad, between the villages of Spišská Belá and Lendak, site called „Blomwiesen“, in fen meadow, close to *Betula* and *Salix* trees, alt. about 800 m, 11 Aug. 1957 leg. K. Kříž (BRNM; see Antonín & Vágner 1999).

ISOTYPE — a duplicate of the holotype collection (PRM 584029).

OTHER COLLECTIONS IDENTIFIED BY SCHAEFER — none. There are three later collected specimens identified (respectively) by J. Kubička, M. Svrček and Z. Pouzar, however, they represent neither original materials nor collections revised by Schaefer.

NOMENCLATURAL STATUS — valid, legitimate.

TAXONOMIC REMARKS — Basso (1999: 385, 389–390) regarded *L. albocreus* as identical with *L. scoticus* Berk. & Broome. However, the Czech *Lactarius* specialist Pouzar feels that the current concept of *L. scoticus* differs from Berkeley & Broome's original concept (Z. Pouzar, pers. comm., May 2013). This discrepancy should be clarified and the name *L. albocreus* considered as a possible name for *L. scoticus* auct. non Berk. & Broome.

Lactarius chrysophyllus Z. Schaefer, Česká Mykologie 11: 52, 1957.

LATIN DIAGNOSIS/DESCRIPTION: Česká Mykologie 11: 52–53, 1957.

DETAILED CZECH DESCRIPTION: Česká Mykologie 11: 50–52, 1957.

HOLOTYPE — not designated.

OTHER TYPE COLLECTIONS — the protologue mentions six localities from the Czech Republic (Těchlovice, Čebínka, Roviny u Heroltic, Radkovice, Kuřim, Sázava nad Sázavou), indicating potential syntypes, but there are no corresponding vouchers in PRM.

OTHER COLLECTIONS IDENTIFIED BY SCHAEFER — CZECH REPUBLIC, BOHEMIA, Rokycany, 22 Aug. 1942, collector unknown (PRM 195218). The collection was revised by Basso (1999: 144).

NOMENCLATURAL STATUS — valid, legitimate.

TAXONOMIC REMARKS — Basso (1999: 138, 143–144) considered *L. chrysophyllus* a synonym of *L. hygginus* (Fr.) Fr.

Lactarius cupricolor Z. Schaefer, Česká Mykologie 20: 158, 1966.

LATIN DIAGNOSIS/DESCRIPTION: Česká Mykologie 20: 158, 1966.

DETAILED CZECH DESCRIPTION: Česká Mykologie 20: 154–156, 1966.

DETAILED GERMAN DESCRIPTION: Česká Mykologie 20: 156–157, 1966.

HOLOTYPE — designated. Czech Republic, Turnov district, Sychrov: castle park, under *Quercus*, *Picea*, *Abies* and distant *Fagus*, 27 Aug. 1961 leg. Z. Schaefer (PRM 584026).

PARATYPES — CZECH REPUBLIC, CENTRAL BOHEMIA, Olešovice: Struhařov, 15 Aug. 1957 leg. K. Kult (PRM 193972); Praha, Divoká Šárka, *Quercus* forest, 7 Sep. 1937 leg. J. Herink (PRM 193865). (Five other records mentioned in the protologue are potential paratypes, but there are no corresponding vouchers in PRM.)

NOMENCLATURAL STATUS — valid, legitimate.

TAXONOMIC REMARKS — species of unclear identity. For type study and discussion see Basso (1999: 131–132), who placed it under *L. vietus* but also compared it with *L. pallidus*.

Lactarius eburneus Z. Schaeff., Česká Mykologie 33: 4, 1979, nom. illegit., non Thiers 1957.

LATIN DESCRIPTION: Česká Mykologie 33: 4, 1979.

GERMAN DISCUSSION: Česká Mykologie 33: 4–5, 1979.

HOLOTYPE — designated. Czech Republic, central Bohemia, near Golčův Jeníkov, mixed forest, 22 Jul. 1949 leg. Z. Schaefer (herb. Z. Schaefer no. 112). Location unknown but probably discarded by Schaefer's family.

NOMENCLATURAL STATUS — valid, illegitimate (a later homonym of *L. eburneus* Thiers).

TAXONOMIC REMARKS — Basso (1999: 723, 735) considered *L. eburneus* Z. Schaeff. identical with *L. glaucescens* Crossl. ($\equiv$ *Lactifluus glaucescens* (Crossl.) Verbeken).

“*Lactarius echinosporus*” Z. Schaeff., Česká Mykologie 14: 237, 1960, nom. inval.

LATIN DIAGNOSIS/DESCRIPTION: Česká Mykologie 14: 237, 1960.

DETAILED CZECH DESCRIPTION: Česká Mykologie 14: 233–235, 1960.

HOLOTYPE — not designated.

SYNTYPES — Czech Republic, Central Bohemia, SW of Prague: Barrandian region, also called Český kras Karst, e.g. near Karlštejn castle, on calcareous bedrock, 1949 leg. K. Kult; 9 Sep. 1958 leg. Z. Schaefer (vouchers nonexistent).

OTHER COLLECTION IDENTIFIED BY SCHAEFER (not mentioned in the protologue) — CZECH REPUBLIC, CENTRAL BOHEMIA, between Karlštejn castle and the village of Mořina, 27 Aug. 1951 leg. A. Pilát (PRM 561154).

NOMENCLATURAL STATUS — invalid: no holotype designated.

TAXONOMIC REMARKS — a fungus belonging to *Russula delica* group (Basso 1999: 330, 454–455).

Lactarius hortensis Velen., České houby [Czech fungi], part 1: 163, 1920, var. *hortensis*

ORIGINAL CZECH DESCRIPTION: České houby [Czech fungi], part 1: 163–164, 1920.

LATIN DESCRIPTION BY SCHAEFER: Česká Mykologie 26: 143, 1972.

HOLOTYPE — nonexistent (Holec & Suková 2007). Czech Republic, central Bohemia, SE of Prague, Mnichovice, Velenovský's garden, under *Corylus* (Velenovský 1920: 163).

NEOTYPE — Slovakia, Banská Bystrica district, Harmanec, stand of *Corylus avellana*, 23 Aug. 1966 leg. Z. Schaefer (PRM 621095, designated by Schaefer 1972: 143).

NOMENCLATURAL STATUS — valid, legitimate. The neotype designation seems inappropriate as it originates from a different country than the original, particularly as the species is common in the holotype area.

TAXONOMIC REMARKS —Korhonen (1984: 130) regards *L. hortensis* as a good species, while Heilmann-Clausen et al. (1998: 52), Basso (1999: 117), Kalamees (2011: 122) regard it as identical with *L. pyrogalus* (Bull.) Fr.

Lactarius hradecensis Z. Schaefer, Česká Mykologie 2: 85, 1948.

LATIN DIAGNOSIS/DESCRIPTION: Česká Mykologie 2: 85, 1948.

DETAILED CZECH DESCRIPTION: Česká Mykologie 2: 83–85, 1948.

HOLOTYPE — nonexistent. Czech Republic, eastern Bohemia, near Hradec Králové, forest called Dehetník, under *Picea* and admixed *Pinus*, *Betula*, *Quercus*, 26 Aug. 1945 leg. Z. Schaefer (Schaefer 1948: 85).

NEOTYPE — Czech Republic, eastern Bohemia, near Hradec Králové, forest called Dehetník, under *Picea*, *Quercus*, *Betula*, 22 Aug. 1961 leg. Z. Schaefer (PRM 584032; designated by Schaefer 1966: 152, 157, as “typus”).

OTHER COLLECTIONS MENTIONED IN NEOTYPE PUBLICATION (Schaefer 1966) — CZECH REPUBLIC, BOHEMIA, Turnov, Sychrov: castle park, 24 Aug. 1961 leg. Z. Schaefer (PRM 584025); Turnov, Valdštýn (= Valdštejn), 19 Aug. 1945 leg. J. Herink (PRM 193660).

NOMENCLATURAL STATUS — valid, legitimate.

TAXONOMIC REMARKS — species of uncertain identity. Basso discussed it under *L. quietus* (Fr.) Fr. (Basso 1999: 504–506) and mentioned it briefly under *L. subdulcis* (Pers.) Gray (Basso 1999: 516).

Lactarius moravicus Z. Schaefer, Česká Mykologie 33: 10, 1979.

LATIN DESCRIPTION + GERMAN DISCUSSION: Česká Mykologie 33: 10, 1979.

HOLOTYPE — designated. Czech Republic, southwestern Moravia, Telč, near fish-pond Pařezitý rybník, *Picea* forest, 4 Aug. 1958 leg. Z. Schaefer (herb. Z. Schaefer no. 58: 21). Location unknown but probably discarded by Schaefer's family.

NOMENCLATURAL STATUS — valid, legitimate.

TAXONOMIC REMARKS — species of unclear identity. Mentioned under *L. vellereus* var. *hometii* (Gillet) Boud. by Basso (1999: 722).

Lactarius pearsonii Z. Schaefer, Česká Mykologie 22: 19, 1968.

= *Lactarius mairei* var. *zonatus* A. Pearson, Naturalist, London: 100, 1950.

LATIN DESCRIPTION: Česká Mykologie 22: 19, 1968.

CZECH DISCUSSION: *Česká Mykologie* 22: 17, 1968. Detailed Czech description cited by Schaefer (1968: 17) was published by Pouzar (1954: 40–41, as “*L. aurantiacoochraceus*”).

HOLOTYPE — designated. Czech Republic, central Bohemia, Beroun district, Karlštejn nature reserve, valley of the Bubovický potok stream, site above its waterfalls, under *Fraxinus*, *Acer*, *Salix*, 23 Aug. 1953 leg. Z. Pouzar, F. Kotlaba & F. Hřebík (PRM 193531).

OTHER TYPE COLLECTIONS — Schaefer (1968: 17) wrote that the species is not rare in former Czechoslovakia. Although he listed localities in central Bohemia (vouchers in PRM), southern Moravia (vouchers in BRNM), and southern Slovakia (voucher in PRM), he did not cite any collections as paratypes. The existing vouchers represent original materials on which the protologue is based.

OTHER ORIGINAL MATERIALS IN PRM (identified as *L. mairei* var. *zonatus* by their collectors) — CZECH REPUBLIC, BOHEMIA, Praha: Kinského sady park, 9 Aug. 1968 leg. E. Wichanský (PRM 682631); 31 Aug. 1964 leg. V. Brambora (PRM 602362). — SLOVAKIA, SOUTHEASTERN SLOVAKIA, Slovenský kras Karst, the village of Vidová near Plešivec, 1 Jul. 1963 leg. F. Kotlaba et Z. Pouzar (PRM 583432).

NOMENCLATURAL STATUS — valid, legitimate.

TAXONOMIC REMARKS — Schaefer (1968: 17) rejected the synonymy of *L. mairei* var. *zonatus* with *L. aurantiacoochraceus* Lj.N. Vassiljeva, which had been proposed by Pouzar (1954). Heilmann-Clausen et al. (1998: 164), Basso (1999: 374, 378–379), and Kalamees (2011: 106) regard *L. pearsonii* as identical with *L. mairei* Malençon.

Lactarius pilatii Z. Schaefer, *Česká Mykologie* 22: 18, 1968.

LATIN DESCRIPTION: *Česká Mykologie* 22: 18–19, 1968.

DETAILED CZECH DESCRIPTION: *Česká Mykologie* 22: 17–18, 1968.

HOLOTYPE — designated. Czech Republic, southwestern Bohemia, Šumava Mts., near the village of Horská Kvilda, Zhůřská slat bog, alt. about 1100 m, under *Betula pubescens*, 22 Aug. 1966 leg. A. Pilát (PRM 624664).

PARATYPES — Czech Republic, southwestern Bohemia, Šumava Mts., near the village of Horská Kvilda, Zhůřská slat bog, alt. about 1100 m, under *Betula pubescens*, 16 Aug. 1965 leg. A. Pilát (PRM 624669, 624658); 16 Aug. 1967 leg. A. Pilát (PRM 628888); 18 Aug. 1967 leg. A. Pilát (PRM 628889); 26 Aug. 1967 leg. A. Pilát (PRM 628886, 628885).

OTHER COLLECTION BY A. PILÁT FROM THE TYPE LOCALITY (not mentioned by Schaefer 1968 but most probably studied by him) — 19 Aug. 1967 (PRM 628887).

NOMENCLATURAL STATUS — valid, legitimate.

TAXONOMIC REMARKS — good species (Heilmann-Clausen et al. 1998: 62–63, Basso 1999: 111–117, Kalamees 2011: 174). Kalamees (2011: 174) considers *L. moseri* Harmaja synonymous with *L. pilatii*. Kalamees cites photographs by Korhonen (1984: 134, labelled *L. moseri*).

Lactarius pinicola Smotl. ex Z. Schaefer, *Schweizerische Zeitschrift für Pilzkunde* 48: 141, 1970.

“*Lactarius deliciosus* var. *pinicola*” Smotlacha, *Atlas hub jedlých a nejedlých* [Atlas of edible and inedible fungi]: 219, 1947, nom. inval. [no Latin description].

LATIN DIAGNOSIS: Schaefer (1970: 141–142).

GERMAN DISCUSSION: Schaefer (1970: 139–142).

HOLOTYPE — designated. Czech Republic, northern Bohemia, district Jablonec nad Nisou, near Turnov, Frýdštejn: near the village of Sněhov, mixed forest (*Pinus*, *Picea*), under *Pinus*, 18 Oct. 1962 leg. Z. Schaefer (PRM 584024, originally labelled as *L. salmonicolor*).

OTHER COLLECTION IDENTIFIED BY SCHAEFER — CZECH REPUBLIC, BOHEMIA, Turnov, Třetí near Radimovice, 21 Sep. 1966 leg. Z. Schaefer (PRM 709711).

NOMENCLATURAL STATUS — valid, legitimate.

TAXONOMIC REMARKS — identical with *L. deliciosus* (L.) Gray (Heilmann-Clausen et al. 1998: 140; Basso 1999: 253, 259; Nuytinck & Verbeken 2005: 131; Kalamees 2011: 70).

Lactarius pyrogalus var. *umbrosus* Z. Schaefer, Česká Mykologie 26: 145, 1972.

CZECH AND LATIN DIAGNOSES: Česká Mykologie 26: 145, 1972.

HOLOTYPE — designated. Czech Republic, Bohemia, NE of Pardubice, near the village of Bělečko, *Picea* forest, 15 Aug. 1944 leg. Z. Schaefer (herb. Z. Schaefer). Location unknown but probably discarded by Schaefer's family.

NOMENCLATURAL STATUS — valid, legitimate.

TAXONOMIC REMARKS — taxonomic value of this variety is unclear. Discussed under *L. pyrogalus* by Basso (1999: 124).

“*Lactarius russuloides*” Z. Schaefer, Česká Mykologie 12: 205, 1958, nom. inval.

LATIN DIAGNOSIS/DESCRIPTION: none.

DETAILED CZECH DESCRIPTION: Česká Mykologie 12: 205–206, 1958.

HOLOTYPE — not designated. The description is based on 3 records from the Czech Republic (Telč, Hulišťata; Třeboň, Spolí; Třeboň, Domanín). None of these specimens is held in PRM.

OTHER COLLECTIONS IDENTIFIED OR REVISED BY SCHAEFER — CZECH REPUBLIC, BOHEMIA, Trhové Sviny, 17 Sep. 1964 leg. J. Kubička (PRM 603730); Tábor, Sudoměřice: Nemyšl, 9 Sep. 1949 leg. M. Svrček (PRM 615083); Poříčany: forest Kersko, 11 Oct. 1955 leg. Z. Pouzar (PRM 621218); Třeboň, Kozákovice, 15 Oct. 1967 leg. J. Kubička et Z. Pouzar (PRM 709721); Třeboň, Domanín, 23 Sep. 1964 leg. J. Kubička (PRM 603726); 7 Sep. 1964 (PRM 603728).

NOMENCLATURAL STATUS — invalid: lacking Latin description or diagnosis and holotype designation. Schaefer erroneously treated the name as a nomen novum (= replacement name; ICN Art. 6.11) for “*L. musteus*” sensu Favre (in Konrad & Maublanc 1937: tab. 331), Kühner & Romagnesi (1953: 477), and Neuhoﬀ (1956: 130) and “*L. pubescens*” sensu Bresadola (1929: tab. 360). Because none of these is a valid name, *L. russuloides* must be interpreted as a sp. nov., rather than a nom. nov.

TAXONOMIC REMARKS — Basso (1999: 171, 175) considers *L. russuloides* is identical with *L. musteus* Fr.

Lactarius syringinus Z. Schaefer, Česká Mykologie 10: 171, 1956.

LATIN DIAGNOSIS/DESCRIPTION: Česká Mykologie 10: 171–172, 1956.

DETAILED CZECH DESCRIPTION: Česká Mykologie 10: 168–171, 1956.

HOLOTYPE — designated. Czech Republic, central Bohemia, E of Praha, near Radošovice („Radešovice“) close to Říčany, site called Vojkov (name of a gamekeeper's lodge and a settlement E of the town of Říčany), in deciduous forest with admixed *Picea* and *Pinus*, Aug. 1953 leg. I. Charvát. Location unknown and possibly nonexistent; probably not preserved by Schaefer who obtained the material by surface mail from I. Charvát (Schaefer 1956: 169).

NOMENCLATURAL STATUS — valid, legitimate.

TAXONOMIC REMARKS — Heilmann-Clausen et al. (1998: 60–61) regard *L. syringinus* as a good species. Basso (1999: 130–131) discusses it under *L. vietus* (Fr.) Fr. and Kalamees (2011: 158) synonymized it with *L. vietus*. Based on more collections and sequences, both from Europe and Russia, *L. syringinus* really seems to fall within the variation of *L. vietus* (Verbeken, pers. comm. 2013).

Lactarius vellereus* var. *bertillonii Neuhoff ex Z. Schaefer, Česká Mykologie 33: 9, 1979.

≡ *Lactarius bertillonii* (Neuhoff ex Z. Schaefer.) Bon, Doc.

Mycol. 10(37–38): 92, 1980 [“1979”].

≡ *Lactifluus bertillonii* (Neuhoff ex Z. Schaefer.) Verbeken,

Mycotaxon 118: 451, 2012 [“2011”].

“*Lactarius vellereus* var. *bertillonii*” Neuhoff, Die Milchlinge: 93, 1956, nom. inval. [no Latin description].

LATIN DIAGNOSIS BY SCHAEFER: Česká Mykologie 33: 9, 1979.

GERMAN DISCUSSION BY SCHAEFER: Česká Mykologie 33: 8–9, 11, 1979.

HOLOTYPE — designated. Czech Republic, central Bohemia, Golčův Jeníkov, mixed forest: *Picea*, *Pinus*, *Abies*, *Betula*, *Quercus*, 22 Jul. 1949 leg. Z. Schaefer (herb. Z. Schaefer no. 41). Currently nonexistent, probably thrown away by Schaefer's family.

NOMENCLATURAL STATUS — valid, legitimate.

TAXONOMIC REMARKS — this variety is now generally accepted as a good species, *L. bertillonii* (≡ *Lactifluus bertillonii*) (Korhonen 1984; Heilmann-Clausen et al. 1998: 254–255; Basso 1999: 709, 713, 718; Kalamees 2011: 58).

Conclusions

We have shown that nine *Lactarius* taxa described by Schaefer are documented by vouchers in PRM. Although some holotypes are missing or nonexistent, paratypes, other original materials, or later collections identified by Schaefer are available for most of them. The taxa should be carefully studied

by classical and molecular methods to determine whether they represent good species (e.g. *L. albocremeus*) or placed into synonymy with earlier published taxa (their current revisions are insufficient). Currently accepted taxa are *L. pilatii* and *L. bertillonii* ($\equiv$ *Lactifluus bertillonii*). The accumulated data on available vouchers provide a good basis for both revisions and future typifications by experienced *Lactarius* specialists.

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